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**JP06346400****PIGMENT-COATED PAPER AND ITS PRODUCTION****MITSUBISHI PAPER MILLS LTD****Inventor(s): ;ARAI TAKAO ;IGARASHI KOJI****Application No. 05131718 , Filed 19930602 , Published 19941220****Abstract:**

**PURPOSE:** To obtain high-quality pigment-coated paper for printing excellent in smoothness and uniformity of thickness and density of the second layer without causing unevenness of the printing.

**CONSTITUTION:** This pigment-coated paper is obtained by providing a coating layer composed of two or more layers and comprises a pigment containing particles having  $\bullet 5\mu\text{m}$  particle diameter at  $\bullet 10\%$  volume fraction thereof based on the whole pigment contained in the first layer coated with the second layer by a curtain coater.

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**PATENT ABSTRACTS OF JAPAN**

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(21)Application number : 05-131718 (71)Applicant : MITSUBISHI PAPER  
MILLS LTD  
(22)Date of filing : 02.06.1993 (72)Inventor : ARAI TAKAO  
IGARASHI KOJI

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(54) **PIGMENT-COATED PAPER AND ITS PRODUCTION**

(57)Abstract:

PURPOSE: To obtain high-quality pigment-coated paper for printing excellent in smoothness and uniformity of thickness and density of the second layer without causing unevenness of the printing.  
CONSTITUTION: This pigment-coated paper is obtained by providing a coating layer composed of two or more layers and comprises a pigment containing particles having  $\cdot 5\cdot\mu$  particle diameter at  $\cdot 10\%$  volume fraction thereof based on the whole pigment contained in the first layer coated with the second layer by a curtain coater.

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CLAIMS

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[Claim(s)]

[Claim 1] the coated layer which makes a pigment and adhesives a principal component -- one side of stencil paper -- at least -- two-layer -- \*\*\*\*\* -- the pigment of the 1st layer with which the 2nd layer is applied in pigment coated paper -- this -- the pigment coated paper which the volume fraction of the pigment grain of 5 micrometers or more of particle diameters is 10% or less, and is characterized by applying the 2nd layer using a curtain coater to all the pigments contained in the 1st layer

[Claim 2] In the manufacture technique of pigment coated paper the coated layer which makes a pigment and adhesives a principal component -- one side of stencil paper -- at least -- two-layer -- \*\*\*\*\* -- The volume fraction of the pigment grain of 5 micrometers or more of particle diameters makes the pigment of the application liquid of the 1st layer 10% or less to all the pigments contained in this application liquid. The manufacture technique of the pigment coated paper characterized by applying this application liquid to stencil paper or the stencil paper which prepared undercoat beforehand, preparing the 1st layer, and painting the 2nd layer on this 1st layer using a curtain coater.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the pigment coated paper and the manufacture technique which are acquired by the curtain coater about pigment coated paper and its manufacture technique.

[0002]

[Description of the Prior Art] Conventionally, pigment coated paper is excellent in smooth nature as compared with the paper of fine quality of a non-coating, and since the absorptivity of ink is uniform, it is widely used as a print sheet. Especially visualization of recent years and printed matter progresses, the proportion of color printing to which multicolor printing is given increases, and the demand to pigment coated paper is also high.

[0003] Although there are many demand qualities to pigment coated paper, it is important that the thickness and the density of a coated layer by which that the smooth nature on the front face of a coated layer where printing is given is high, and printing ink are received are uniform.

[0004] The smooth nature on the front face of a coated layer affects the amount of acceptance of printing ink. That is, if the smooth nature on the front face of a coated layer is low, in offset printing which is especially the common version, the amounts of acceptance of printing ink will differ in the fraction which became depressed relatively, and the projected fraction, the shade nonuniformity of ink will be produced in the streak section whose amount of acceptance of ink should be uniform, and the quality as printed matter will be spoiled.

[0005] the printing ink with which the thickness and the density of a coated layer were received by the coated layer -- or it wets and the amount of penetration of water is affected That is, the failure called "reverse projection" to which ink permeates to a stencil paper layer since there is little capacity which may absorb printing ink inside a coated layer in the fraction with the thin thickness of a coated layer relatively even when the amount of acceptance of in [ when the thickness of a coated layer is uneven ] the coated layer front face of ink is uniform, the amount of the ink on the front face of a coated layer falls relatively, concentration nonuniformity is produced or a surface picture image is transparent at the rear face occurs. printing ink [ in / since a penetration speed becomes slow in the fraction with a high density when the density of a coated layer is uneven / a front face ] -- or it wets and the abundance of water increases relatively Especially, when there is much surface abundance of printing ink, ink concentration becomes high relatively, it becomes the cause of concentration nonuniformity, and when solidification of printing ink is inadequate, back trap \*\*\*\*\* is produced. Since the amount of imprints of the printing ink which is wetted, and should next be imprinted when there is much surface abundance of water is suppressed, concentration nonuniformity is produced. Therefore, the thickness and the density of a coated layer have a uniform desirable thing, when a printing quality is taken into consideration.

[0006] As a means to fill such a quality demand [ like ], the method of performing a multilayer application is in stencil paper. That is, when the coated layer of a monolayer is applied on the stencil

paper with which the surface irregularity resulting from the formation of a stencil paper layer exists, it is very difficult to fulfill simultaneously two conditions, to acquire [ obtaining high smooth nature in a coated layer front face, and ] high homogeneity in the thickness or the density of a coated layer.

Therefore, by performing a multilayer application, by the 1st layer to which the 2nd layer (it abbreviates to the 2nd layer hereafter.) used as the best layer is applied, the smooth nature on the front face of stencil paper (it abbreviates to application stencil paper hereafter.) which prepared stencil paper or undercoat can be improved, and high smooth nature, uniform thickness, and a density can be attained in the 2nd layer.

[0007] In such technique, although the application method which performs the 2nd-layer application is crossed variably, specifically, a blade application method, an air knife application method, and a roll application method can be held. It is being able to apply the application liquid which is the easy operation in comparison and makes a pigment and adhesives a principal component as a characteristic feature with which these application methods' were common. However, quality pigment coated paper was not able to be obtained in these application methods.

[0008] That is, a blade application method is a post-measurement type application method which fails to scratch excessive liquid with a blade, after supplying application liquid to application stencil paper superfluously. In a blade application method, although unescapable application defects are a streak and a scratch, when the 1st layer is prepared and smoothed in application stencil paper, exclusion of the foreign matter leading to such an application defect is difficult, and defective occurrence will become remarkable. Moreover, in such an application method, since the water or the adhesives component in application liquid permeates beyond the need at the application stencil paper (it abbreviates to a web hereafter.) which prepared the 1st layer in between from supply of surplus liquid to measurement and a high pressure is applied to application liquid directly under [ at the time of measurement / blade ], permeation to the water in application liquid or the web of an adhesives component advances still notably. For this reason, by the 2nd layer, since an adhesives component decreases relatively, a coated layer intensity becomes low. Moreover, the product of the quality which composition of application liquid changed with the passage of time, and was stabilized unlike composition of the liquid before supply as a part for a surplus by the liquid which failed to be scratched cannot be obtained.

[0009] An air knife application method is a post-measurement type application method which fails to scratch excessive liquid with a wind pressure, after supplying application liquid to a web superfluously. Such an application method tends to generate a pattern peculiar to an air knife in a coated layer, and the smooth nature of the 2nd layer front face falls remarkably, and it is uneven thin with this.

Moreover, in such a method of application, if it enlarges a wind pressure although it is necessary to make a wind pressure high when high-speed-izing an application speed, or in high-concentration-izing liquid concentration, occurrence of such a pattern not only becomes still remarkable, but turbulence of flowing of an airstream will occur and the ambient noise by the blowdown will become remarkable. therefore, since a wind pressure cannot be enlarged at \*\* et al., it is not suitable for a manufacture of the pigment coated paper demanded for it to be comparatively alike and to apply hyperviscous liquid at high speed

[0010] The roll application method has the common method of application which \*\*\*\*s liquid by imprint of the application liquid during a roll combining two or more rolls, and is fundamentally imprinted to a web, although the thing of various formats exists with the combination of a roll etc. Such an application method is difficult for being easy to generate a pattern peculiar to a roll, and the smooth nature of the 2nd layer falling in the case of the sublation after an imprint of an application roll side and a web, becoming still uneven [ thickness ], and filling the demand quality to a print sheet in recent years.

[0011] In the 1st layer, a curtain application method is an application method which solves the peculiar problem in a blade, an air knife, and a roll application method, when smooth nature is very high. However, in a curtain application method, there is no scratch dropping, and since the thickness of the curtain layer with uniform thickness is reflected in the thickness of the 2nd layer as it is, the

configuration of the 1st layer front face where an application is performed will do the serious influence for the configuration of the front face of the 2nd layer by which the curtain application was carried out. That is, although the thickness and the density of a coated layer are uniform, smooth nature is low or smooth nature becomes high after calender finishing, it may produce un-arranging [ from which the thickness and the density of a coated layer become uneven ].

[0012] Furthermore, although application liquid is stuffed into a concavity in the post-measurement type application method where the load of the high pressure is carried out to application liquid at the time of measurement when irregularity exists in a web In a curtain application method, since the pressure by which is a pre-measurement type application method and a load is carried out to application liquid at the time of an application is low, when irregularity exists in a web, application liquid is not stuffed into a concavity, but a coated layer is formed only by the heights, and un-arranging used as application unevenness may arise.

[0013]

[Problem(s) to be Solved by the Invention] The purpose of this invention has the high smooth nature of the 2nd layer for which it was difficult to obtain in the blade application method which is a post-measurement type application method, an air knife application method, and a roll application method, and it is obtaining the pigment coated paper with uniform thickness and density.

[0014]

[Means for Solving the Problem] In pigment coated paper and its manufacture technique the coated layer to which this invention makes a pigment and adhesives a principal component -- one side of stencil paper -- at least -- two-layer -- \*\*\*\*\* -- the pigment contained in the 1st layer to which the 2nd layer is applied -- this -- the volume fraction of the pigment grain of 5 micrometers or more of particle diameters considering as 10% or less of a thing to all the pigments contained in the 1st layer, and by applying the 2nd layer using a curtain coater The smooth nature of the 2nd layer is high and it finds out that the pigment coated paper with the high homogeneity of thickness and a density is obtained.

[0015] That is, in a curtain application method, since the thickness of the curtain layer with uniform thickness is reflected in the thickness of a coated layer as it is, the granularity with the detailed 1st layer front face where the 2nd-layer application is given does the serious influence for the thickness of the smooth nature of the front face of the 2nd layer, and the 2nd layer, and a density. Therefore, the smooth nature of a detailed thing, then the 2nd layer front face and the homogeneity of the thickness density of the 2nd layer can improve the pigment which constitutes the 1st layer, and the property desirable as pigment coated paper that printing is given can be acquired now.

[0016] Moreover, it is the field (an application line field is called hereafter.) where a curtain layer and the 1st layer contact it not only affects the smoothness of the 2nd layer, thickness, and a density, but, and accompanies to a web, and the granularity of the front face of the 1st layer has a close relation to the amount of the air which forms an air space between a coated layer and a web layer. That is, when the 1st layer of the big pigment of a particle diameter is contained, a disturbance of air happens on the 1st layer front face, or the angle which a curtain layer and the 1st layer front face make partially in an application line tends to change, air company occurs in the fraction which gets wet as a result and not happening, and the foam remains to a coated layer. Remains of such foam tend to happen by the concavity of the concavo-convex section which consists of a big pigment of a particle diameter especially.

[0017] the pigment of the 1st layer with which the 2nd layer is applied when the pigment which constitutes the 1st layer is examined zealously here -- this -- to all the pigments contained in the 1st layer by making the volume fraction of the pigment grain of 5 micrometers or more of particle diameters into 10% or less It stops observing the foam of the 2nd layer resulting from the air accompanied to the web, and came to find out that the 2nd layer has high smooth nature and the homogeneous high pigment coated paper of a coated layer is obtained.

[0018] Although characterized by applying the application liquid which made a pigment and adhesives

the principal component like the above in this invention using a curtain coater the pigment of the 1st layer with which the 2nd layer is applied -- this -- to all the pigments contained in the 1st layer by the volume fraction of the grain of 5 micrometers or more of particle diameters being 10% or less of a thing, and applying the 2nd layer using a curtain coater The smooth nature of the 2nd layer is high and what indicated the technique of obtaining the pigment coated paper with the high homogeneity of thickness and a density is not yet found.

[0019] Hereafter, based on an accompanying drawing, the embodiment of this invention is explained in detail. Drawing 1 is a schematic diagram of the coater for the 2nd-layer application of pigment coated paper which showed the embodiment of this invention. From the application liquid storage tank 11, the application liquid prepared beforehand is sent to the coating-machine head 1 with the liquid supply pump 12. In this case, since the amount of liquid sending of application liquid is in the coverage and proportionality of a final product, it is necessary to perform the amount control of liquid sending of the application liquid to the coating-machine head 1 with a sufficient precision. So, as a liquid supply pump 12, the amount [ of variable flows ] type flow rate pump constant [ non-rippled ] is suitable.

[0020] The interior of the coating-machine head 1 consists of a manifold 6 and a slit 2, and respectively highly precise finishing is given. The supplied application liquid is filled by the manifold 6, in the narrow clearance through which it passes when further sent to a slit 2, the influence of the dynamic pressure by liquid sending of the liquid supply pump 12 is mitigated, the pressure distribution in the cross direction are equalized, and it flows out from a lip 3, and forms the perpendicular curtain layer 4.

[0021] The perpendicular curtain layer 4 with which the profile became uniform crosswise contacts the web 5 which is carrying out the continuity run, and is applied to a web 5. The edge guides 10a and 10b do not exceed the width of face of the coating-machine head 1 here, but the width of face of a web 5 is exceeded further, and it is prepared, and a perpendicular curtain layer exceeds the width of face of a web 5, and is formed. The perpendicular curtain layer 4 exceeds the width of face of a web 5, and it is formed for preventing thick coating of the coated layer in the both ends of the perpendicular curtain layer 4. The application liquid which exceeds the width of face of a web 5 and flows down is collected by the liquid receiver 9, and after returning to the application liquid storage tank 11, it is applied again. Moreover, application liquid is collected by the liquid receiver 9, when a web 5 cuts and an application is interrupted.

[0022] In the application line field of the web 5 and the perpendicular curtain layer 4 which are carrying out the continuity run, it restricts and covers, and the airstream accompanied to a web 5 is prepared in \*\*\*\*\* 8, in order [ being possible ] to reach a web 5, without confusing the perpendicular curtain layer 4 by the time style of the air of the curtain circumference etc. Moreover, by changing the course with a roll 7 just before an application line field, the conveyance orientation of a web 5 is constituted so that the influence of the application line field on the air accompanied to a web 5 may be minimized.

[0023] Although the height from a web 5 to the outflow section of the coating-machine head 1 lower part is needed to some extent in order to apply the perpendicular curtain layer 4 made to form in the status that it was stabilized, it is also possible to control the height in this embodiment, and the height suitable for the stability of the perpendicular curtain layer 4 is 120-180mm still preferably 100-250mm preferably 60-300mm.

[0024] this invention cannot be overemphasized by that various deformation is possible, without being limited to the above embodiment. Although width of face of the formed curtain layer was made into size from the width of face of a web 5 in the embodiment mentioned above [ whether this is for preventing the increase in the coverage in coated layer both ends, and such an increase in a coverage is smallness, and ] Or when seldom considering as a problem, or when it can cancel by adopting the technique indicated by JP,49-14130,B etc., in addition the increase prevention technique in a coverage, a perpendicular curtain layer is made in agreement with the width of face of a web 5, or it

does not interfere as smallness somewhat from this.

[0025] Moreover, it is also possible to attach a profile adjustment device or a controlling mechanism to a curtain head. When the opening profile adjustment device was attached to the slit 2 especially shown in drawing 1 and especially application width of face becomes large, a more uniform coverage profile can be obtained crosswise.

[0026] The coated paper in this invention points out what prepared the coated layer constituted at least considering a two-layer pigment and two-layer adhesives as a principal component in one side or both sides of stencil paper.

[0027] As stencil paper which can be used in this invention, the paper of fine quality generally used, a report grade paper, \*\*\*\*, a synthetic paper, a plastic film, etc. are included unexceptional.

[0028] In this invention, application methods, such as a blade, an air knife, a rod, a meter ring bar, a curtain, a die, a lip, a slide hopper, a comma, micro gravure, a gate roll, a paddle, a gravure roll, and a reverse-video roll, are held as an application method which can be used for the 1st-layer application. Moreover, the 1st-layer application can also take which method of the method which attaches to a paper machine and is applied in an on-machine format, and the method applied independently in an off machine format with a paper machine.

[0029] In this invention, as an application method which can be used for the 2nd-layer application, although limited to a curtain application method, an extrusion method and a slide method are included unexceptional as a method of an application head. Moreover, the coater of the 2nd layer can also be installed [ also installing in an independent line, and ] in the same line combining the coater of taking the on-machine format attached to the paper machine, or undercoat.

[0030] In this invention, the application liquid which makes a pigment and adhesives a principal component is the liquid water was made to melt or distribute with a pigment, adhesives, in addition an additive, and the solid-content concentration of a pigment, adhesives, in addition an additive says 10 - 70% of the weight of a thing. As for the blending ratio of coal of a pigment and adhesives, it is desirable that adhesives are generally 10 - 70 weight section preferably more than 5 weight section to the pigment 100 weight section.

[0031] As a pigment used by this invention, a kaolin, clay, a calcium carbonate, a satin white, titanium oxide, an aluminum hydroxide, a zinc oxide, a barium sulfate, a calcium sulfate, a silica, the activated clay, a lake, a plastics pigment, a binder pigment, etc. are mentioned.

[0032] As adhesives used for this invention, a styrene butadiene system, vinegar \*\* and acrylic, Various copolymers, such as ethylene and a vinegar \*\* system, a butadiene methyl methacrylic system, and a vinegar \*\* butyl acrylate system, Polyvinyl alcohol, a maleic-anhydride copolymer, an isobutene and a maleic-anhydride copolymer, Synthetic system adhesives, such as an acrylic acid and a methyl methacrylate system copolymer, an oxidized starch, The adhesives generally known, such as natural system adhesives, such as a etherification starch, an esterification starch, a cold-water soluble starch that carries out flash plate dry cleaning of an enzyme denaturation starch or them, and is obtained, casein, and soybean protein, are mentioned. Moreover, the various assistants blended with the usual pigment application liquid for coated paper, such as a thickener, a water retention agent, a deck-watertight-luminaire-ized agent, and a coloring agent, can use it suitably if needed.

[0033] The application constituent of this invention obtained in this way adjusts the volume fraction of the pigment grain of 5 micrometers or more of particle diameters to 10% or less to all the pigments contained in application liquid, is applied as the 1st layer, and is applied to such a 1st layer front face as the 2nd layer.

[0034] In this invention, the coverage of the application liquid which makes a principal component the pigment and adhesives which are used for the 2nd layer or the 1st layer is dry weight canon, and 3-30g/m<sup>2</sup> is [ two or more / 1g //m ] / suitable for it preferably.

[0035]

[Function] the pigment of the 1st layer with which the 2nd layer is applied in this invention -- this -- to all the pigments contained in the 1st layer, the volume fraction of the pigment grain of 5 micrometers



or more of particle diameters is 10% or less, and when the 2nd layer applies using a curtain coater, the pigment coated paper with the high homogeneity of thickness and a density can be obtained [0036]

[Example] Hereafter, an example is hung up in order to make the effect of this invention much more clear. In addition, as long as all number of copies in an example shows the weight section and there is no notice especially, concentration shows weight [ of solid-content concentration ] %, and a coverage shows a xeransis coverage.

[0037] To 60g of example 1 basis weights/, and the paper of fine quality of m2, by the blade coater, the solid-content concentration of the following combination applied the application liquid which is 58% by part for 1000m/in application speed as the 1st layer liquid, and produced the web so that a coverage might be set to 10g/m2. Moreover, trituration processing of the pigment was carried out using the ball mill, and the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in application liquid ] was adjusted to 3.1%.

[0038]

The <1st-layer application liquid combination> marketing whiting (car \*\*\*\*\* 75) 100 section marketing polyacrylic-acid system dispersant 0.4 section marketing phosphorylation starch 6 section marketing styrene butadiene latex The six sections [0039] The curtain coater was used for the web obtained before, an application and xeransis were performed so that a coverage might be set to 15g/m2 at 800m application speed for /, the 2nd-layer application liquid whose solid-content concentration is 48% was produced by the following combination, and pigment coated paper was obtained.

[0040]

The <2nd-layer application liquid combination> marketing whiting (car \*\*\*\*\* 90) The 1st class kaolin of 20 section marketing (ultra white 90) 70 section marketing satin white 10 section marketing polyacrylic-acid system dispersant 0.5 section marketing phosphorylation starch 2 section styrene butadiene latex The 14 sections [0041] Except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in the layer / example 2 / the 1st layer / application liquid ] to 8.4%, it is the same technique as an example 1, and pigment coated paper was obtained.

[0042] Combination of the layer [ example 3 / the 1st layer ] application liquid was considered as the following combination, except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in undercoat application liquid ] to 4.2%, it is the same technique as an example 1, and pigment coated paper was obtained.

[0043]

The <1st-layer application liquid combination> whiting (car \*\*\*\*\* 75) The 2nd class kaolin of 50 section marketing (hide lath pass) 50 section marketing polyacrylic-acid system dispersant 0.2 section marketing phosphorylation starch 6 section marketing styrene butadiene latex The six sections [0044] Except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in the layer / example 4 / the 1st layer / application liquid ] to 8.1%, it is the same technique as an example 3, and pigment coated paper was obtained.

[0045] Except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in the layer / example of comparison 1 / the 1st layer / application liquid ] to 11.9%, it is the same technique as an example 1, and pigment coated paper was obtained.

[0046] Except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in the layer / example of comparison 2 / the 1st layer / application liquid ] to 18.5%, it is the same technique as an example

1, and pigment coated paper was obtained.

[0047] Except having adjusted the volume fraction [ as opposed to all the pigments of the pigment grain of 5 micrometers or more of particle diameters for the pigment contained in the layer / example of comparison 3 / the 1st layer / application liquid ] to 12.1%, it is the same technique as an example 3, and pigment coated paper was obtained.

[0048] As a coater of the layer [ example of comparison 4 / the 2nd layer ] application liquid, except having used the blade coater, it is the same technique as an example 1, and pigment coated paper was obtained.

[0049] As a coater of the layer [ example of comparison 5 / the 2nd layer ] application liquid, except having used the air knife coater, it is the same technique as an example 1, and pigment coated paper was obtained.

[0050] As a coater of the layer [ example of comparison 6 / the 2nd layer ] application liquid, except having used the offset gravure coater, it is the same technique as an example 1, and pigment coated paper was obtained.

[0051] All the obtained pigment coated paper was evaluated after performing calender processing on the same conditions.

[0052] Measurement of the measuring method particle diameter of a particle diameter is particle-size-distribution meter LEED of a laser interference formula. AND It carried out about pigment variance liquid using PC micro truck made from NORTHRUP.

[0053] As an evaluation item of pigment coated paper, as smooth nature of coated paper, \*\*\*\*\* star smoothness was adopted and homogeneity of the thickness of the 2nd layer and a density was performed by carrying out visual evaluation of the covering test piece which used the ammonium chloride. Moreover, visual evaluation was carried out after printing also about the nonuniformity after printing.

[0054] The \*\*\*\*\* star smoothness of the 2nd layer of the measuring method of smoothness was measured with the \*\*\*\*\* star smoothness testing machine (\*\*\*\* electronic industry incorporated company make, formal SM-6A). (Unit:mmHg)

[0055]

The homogeneous evaluation technique of thickness and a density (the covering examining method) Homogeneous evaluation of thickness and a density absorbs a sample in the 2.5wt% water-isopropyl alcohol solution of an ammonium chloride, and made the filter paper absorb a surplus sample solution after immersing, and the stencil paper layer and the calcium carbonate of the 1st layer were burned by 130 degreeC, and it carried out by technique to carry out distribution status viewing evaluation of the kaolin clay of the 2nd layer. The whole surface crossed [ the coated layer ], and when uniform, it was judged as O, and when it was partially uneven, or the grade of nonuniformity was very small and \*\* and nonuniformity were [ being O and / nonuniformity is a little conspicuous and ] very conspicuous, it judged it as x.

[0056] Evaluation of the evaluation technique printing nonuniformity of printing nonuniformity was wetted in 4 color-printing Roland offset press, was printed on condition that the excess of water, and was left at the room temperature one whole day and night, and viewing performed it about the printing section whose rate of area of the half tone dot of the monochrome of the cyanogen of a sample is 50%. (5 is most excellent in unit:5 phase evaluation)

[0057]

[Table 1]

	塗布 方式	>5 $\mu$ m 体積分率 [%]	第2層 平滑度 [mmHg]	厚み 密度 均一性	印刷 ムラ
実施例1	カーテン	3.1	8	◎	5
"2	カーテン	8.4	9	◎	5
"3	カーテン	4.2	6	◎	5
"4	カーテン	8.1	8	◎	5
比較例1	カーテン	11.9	10	○	4
"2	カーテン	18.5	14	△	3
"3	カーテン	12.1	13	○	4
"4	ブレード	3.1	9	○	4
"5	エアーナイフ	3.1	11	△	2
"6	ブレード	3.1	30	×	1

[0058] although the evaluation result as shown in the <evaluation result> table 1 was obtained -- a blade coater -- in the offset gravure coater, by occurrence of a split pattern, the homogeneity of thickness and a density was spoiled by occurrence of an air knife pattern in the air knife coater, and was spoiled by occurrence of a streak, and occurrence of printing nonuniformity was looked at Although the homogeneity of thickness and a density will be spoiled and occurrence of printing nonuniformity will be seen if the volume fraction of the pigment grain of a particle diameter 5 micrometers or more exceeds [ the pigment of the 1st layer of a web ] 10% when a curtain coater is used, 10% or less of a case has the high smoothness of the 2nd layer, the homogeneity of thickness and a density is high, and the quality pigment coated paper without occurrence of printing nonuniformity can be obtained.

[0059]

[Effect of the Invention] According to this invention, in the coated paper which prepares the coated layer more than two-layer, it excels in the homogeneity of the smooth nature of the 2nd layer, thickness, and a density, and the quality pigment coated paper for printing without occurrence of printing nonuniformity can be obtained.

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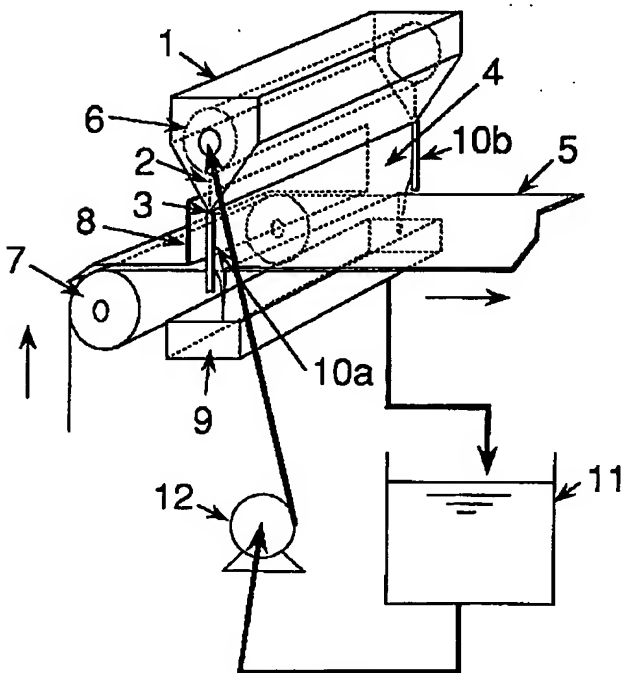
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DRAWINGS

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[Drawing 1]



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